REMARKS

Claims 98-100, 102-106 and 119-130 are pending in the application. Claim 101 has been cancelled, and claim 98 has been amended to include the "spraying" limitation of cancelled claim 101. Cancelled claim 101 previously depended from claim 98, so no new matter has been added that would necessitate a new search. The "gas/vapor atmosphere" language that was previously added to claim 98 has been removed to overcome the § 112 rejection at paragraph 2 of the Office Action. Reconsideration and withdrawal of the remaining rejections are requested in view of the following remarks.

The claimed methods all include spraying a semiconductor article, wafer, or workpiece with a heated aqueous solution in combination with the use of ozone, as described at pages 12-14 of the application. The claims are not directed to immersion. Indeed the step of spraying, as claimed, is not consistent with or useful in immersion applications. An immersed or submerged spray would simply randomly disperse throughout the immersion liquid and could not reach the workpiece as intended. None of the cited references, alone or in combination, suggest spraying a semiconductor article with a heated solution while exposing the article to ozone. As explained at pages 1-4 of the application, the liquid bath/immersion cleaning techniques currently used in the semiconductor manufacturing industry require a relatively large number of steps, using a relatively large number of chemicals. As a result, they are time-consuming and they slow the manufacturing process.

Additionally, the equipment required to perform these liquid bath techniques is bulky, as various tanks are needed, and the fabrication facility must therefore provide space for the tanks. This adds to the overall processing costs. Moreover, the spent

chemicals from such facilities must be appropriately disposed of in an environmentally acceptable way, further increasing the costs for cleaning semiconductor articles. It does not appear that any of the immersion prior art references discussed above have overcome these disadvantages.

Turning to the § 103 rejections at paragraph 4 of the Office Action, with respect to the claimed heated solution and ozone elements, the cited prior art falls into either the immersion tank processing category or the spin-processing category. Fukazawa '940, Otsuka JP H03-208900, and Wada JP 62-117330 are in the immersion category. Specifically, Otsuka et al. and Wada et al. teach bubbling an oxidizing gas onto a wafer immersed in a liquid bath. Otsuka describes immersion in a solution having a maximum temperature of 80° C, optionally including ozone gas bubbles (Translation p. 9). Wada et al. describes a cleaning liquid bath at up to 140° C, with ozone bubbling up to an immersed wafer. Fukazawa et al. teaches placing a wafer into a cleaning vessel that is filled with overflowing deionized water (abstract; col. 2, lines 42-45). Fukazawa is silent on temperature.

Hence, among these immersion prior art references (which may also disclose use of ozone, dissolved or bubbled into the immersion bath), there is no suggestion to use a heated liquid and ozone in a spray (non-immersion) application, as claimed. Indeed, these references do not contemplate or suggest spraying, as recited in claims 98, 122 and 127, or rotating, as recited in claims 98 and 128, because they teach only immersion, and spraying and/or rotating are not useful or feasible in immersion processing.

The claims recite "spraying a surface of a wafer/article with a heated aqueous solution," or "spraying a heated aqueous solution onto the surface of a workpiece." Such steps cannot reasonably be performed in an immersion application, because when a workpiece is immersed in a liquid bath, spray cannot effectively be delivered to a surface of the workpiece. Spray droplets cannot move through the liquid bath, and would not directly reach the workpiece surface, in an immersion application. Thus, the combination of Fukazawa with either Otsuka or Wada does not yield any of the claimed methods, since all of these references are directed to immersion processing, and the claimed spray methods clearly exclude immersion processes.

Ohmi et al. relates to spin-processing. As noted by the Examiner, Ohmi et al. does not teach the use of a heated liquid, which is recited in each of the claims. There is also no suggestion to combine the teachings of Ohmi et al., which teaches a spin-processing technique, with the teachings of any reference that teaches an immersion technique (e.g., all of the other cited references). This is because very different considerations must be taken for spin-processing methods than for immersion methods, as explained above and throughout the application.

In fact, Ohmi et al. specifically teaches away from using an immersion technique, and describes spin-processing, or "rotary cleaning," as an improvement over immersion, or "soaking," methods. For example, Ohmi et al. states that "the improvement of cleanliness is limited in the cleaning by soaking method and therefore [the inventor] attempted rotary cleaning" (col. 3, lines 60-62). Thus, Ohmi et al. employs spin-processing, or "rotary cleaning," to overcome the problems associated with immersion processing.

Additionally, Ohmi maintains that the rotary cleaning method can achieve in 30 *seconds* what it takes 60 *minutes* to achieve in the soaking (i.e., immersion) method (col. 4, lines 50-55). Thus, Ohmi et al. makes it clear that there is a significant distinction between immersion processing and spin/rotary processing, and that the two processes are exclusive of one another. Furthermore, Ohmi et al. teaches using the spin-processing method as an improvement over immersion processing, due to the improved cleanliness and significantly faster processing times that spin-processing produces. Thus, Ohmi et al. clearly teaches away from employing an immersion technique. Accordingly, it is improper to combine the teachings of Ohmi et al. (a spin-processing reference) with the teachings of an immersion reference, such as Fukazawa, Otsuka, or Wada, and therefore, no combination of the cited references is proper to yield the claimed methods ("It is improper to combine references where the references teach away from their combination." MPEP §2145(X)(2)).

In view of the foregoing, it is submitted that the claims are in condition for allowance, and a Notice of Allowance is requested.

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